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‘HURRAH FOR THE MISSING LINK!’: A HISTORY OF APES, ANCESTORS
AND A CRUCIAL PIECE OF EVIDENCE

by

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In the nineteenth century the idea of a ‘missing link’ connecting humans with the rest of the
animal kingdom was eagerly embraced by professional scientists and popularizers. After
the publication of Charles Darwin’s *Origin of Species* in 1859, many tied the idea and
subsequent search for a crucial piece of evidence to Darwin and his formulation of the
theory of evolution by natural selection. This article demonstrates that the expression was
widely used and that the framework for discussions about human’s relation to the apes
and gaps in the fossil record were well in place and widely debated long before *Origin of
Species* became the standard reference for discussing human evolution. In the second half
of the century the missing link gradually became the ultimate prize in palaeoanthropology
and grew into one of the most powerful, celebrated and criticized icons of human evolution.

**Keywords:** anthropology; Charles Darwin; evolution; human origins;
missing link; nineteenth century

A CRUCIAL PIECE OF EVIDENCE

In November 1894 Alfred Russel Wallace wrote, in an excited letter to geologist Clement Reid,
‘The great, the grand, and long-expected, the prophesied discovery has at last been made—
Miocene or Old Pliocene Man in India!!!’ The background for Wallace’s excitement was a
report in the journal *Natural Science* by the palaeontologist Thomas Rupert Jones about the
discoveries of ‘good worked flints’ found in situ as part of the Geological Survey of India.
Wallace ended his letter on a rather enthusiastic note: ‘Of course we want the bones, but we
have got the flints, and they may follow. Hurrah for the missing link!’1

A few years earlier Wallace had ruled out Africa as a possible ‘birthplace for man’. Instead he pointed to Asia in his comprehensive synthesis of evolutionary theory, *Darwinism*, published in 1889. If that hypothesis was correct, he argued, ‘we can better understand how it is that we have as yet met with no traces of the missing links, or even of man’s existence during late tertiary times, because no part of the world is so entirely unexplored by the geologist as this very region.’ However, there were good reasons for

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optimism, Wallace reflected: ‘The area in question is sufficiently extensive and varied to admit of primeval man having attained to a considerable population, and having developed his full human characteristics, both physical and mental, before there was any need for him to migrate beyond its limits.’ Against this background it is not difficult to understand Wallace’s enthusiasm in his letter to Reid about Rupert Jones’s discovery. The new findings confirmed Wallace’s prediction.

In *Descent of Man* (1871), Darwin had tentatively suggested Africa as the cradle of mankind. He was supported by Thomas Henry Huxley, who found evidence in the anatomical similarities between humans and the African apes. Charles Lyell did not rule Africa out, but was most inclined to think that Asia would be the place to look for fossil evidence of human ancestors. In the early 1860s Wallace had convinced him that some caves in Borneo looked promising. In April 1864 Erasmus Darwin wrote to his brother Charles that Lyell during a visit had ‘said that we should probably find our progenitors there if anywhere’. In February the same year Lyell had written to the gentleman geologist William Pengelly, who had been actively engaged in establishing the antiquity of the human occupation of Britain through a series of cave excavations. Lyell explained that Wallace had told him about the limestone caves in Borneo that ‘deserve more than any in the whole world to be explored, as he [Wallace] feels sure they must contain the bones of extinct species of anthropomorphous apes most nearly allied to man.’ A few months later Lyell returned to the topic in a letter to a Harvard professor, George Ticknor, who in an earlier correspondence reported that he had very much enjoyed reading Lyell’s *Antiquity of Man*, published in 1863. To Ticknor, Lyell was less cautious in expressing his expectations as to what could be found in the Borneo caves: ‘I hope to get extinct orangs, if not the missing link itself.’ This expressed more confidence than the cautious remarks in *Antiquity of Man*, in which Lyell had suggested that the tropical regions of Africa and the islands of Borneo and Sumatra were likely places to search for ‘fossil remains of the intermediate links of the chain.’ Lyell’s patience had given way to excitement, making Africa less of a favourite in the search for the missing link.

Similarly, the German evolutionist Ernst Haeckel favoured Asia as the most likely origin of the human species. In *The Natural History of Creation* published in Germany in 1868 Haeckel had introduced a series of evolutionary stages. The anthropoid apes were located on the twentieth stage and modern human on the twenty-second stage, reserving the twenty-first stage for a hypothetical prehistoric missing link, the speechless man or *Pithecanthropus alalus*, connecting apes and humans. His home was placed in the supposedly sunken continent Lemuria that was assumed to have existed between Africa and Asia: ‘this primeval home, or the so-called “Paradise”, the “cradle of the human race”’. Haeckel did not entirely dismiss Africa in the evolutionary history of mankind but thought it to be a less likely place of origin. This led the young Dutch anatomist Eugène Dubois to search for Haeckel’s *Pithecanthropus alalus* in Asia. Dubois thought he had found it in the early 1890s when he discovered a few fossil fragments of what came to be known as the Java Man, or, as Dubois called it, *Pithecanthropus erectus*. Not everybody in the scientific community agreed about the interpretation of the fossil and what to make of it. In the news and popular press, however, it made headlines worldwide. Finally, at long last, Dubois had found the missing link.

Confidence and determinism went hand in hand as scientific optimism was on the rise among anthropologists, archaeologists, geologists, palaeontologists and anatomists. There were many empirical indicators attesting to the accumulating evidence for a
deep ancestry of humankind and furthermore an almost inevitable theoretical necessity in predicting the physical confirmation of the continuity of nature from animals to humans. It would only be a matter of time before the missing link was found, if, as Dubois and Haeckel among others thought, it had not been found already in *Pithecanthropus erectus*.

The idea of a crucial piece of evidence once and for all linking humanity to the rest of nature was not restricted to discussions within the scientific community. By the end of the nineteenth century ‘the missing link’ had become a familiar expression primarily used with reference to human evolution and specifically referring to a hypothetical link between humans and apes. It was used as a convenient shorthand and embraced with equal enthusiasm by scientific professionals and amateurs, journalists and popularizers of science, entertainers and exhibitors. After decades of theoretical discussions, anatomical analogies between humans and primates, lectures, reports from scientific meetings, books, short stories, advertisements, exhibitions, street performances, satire, practical jokes and fabricated discoveries, by the 1890s archaeological and palaeontological research was finally gaining ground and was increasingly able to provide scientific and popular audiences with a long-awaited material basis and strong evidence for the existence of the missing link.

**The Darwin Narrative and Human Origins**

A good question is: where did the idea of a missing link come from? Shortly after the publication of Charles Darwin’s *Origin of Species* in 1859 the idea of missing links in general, or gaps in the fossil record, became intimately tied to evolutionary theory and to Darwin himself. That remained to be the case throughout the century, and has to a large extent informed historiographical reflections ever since. In her now classic study of narratives of human evolution Misia Landau begins her narrative with Darwin. While disclosing deep underlying narrative structures in works by prominent writers on human evolution that are shared by basic structures of hero myths and folktales, to Landau Darwin serves as an unquestioned point of origin. Accordingly, in Landau’s own narrative Darwin assumes the role of the hero equivalent to the one she has revealed to be at work in the evolutionary narratives. The story of human evolution begins with a hero, Landau argues. The story of human evolutionary studies begins with Darwin.

One of the big problems in historical studies of evolution is to maintain the right balance, to secure symmetry and impartiality in causal explanations and narratives. It is nevertheless difficult to resist the temptation of letting Darwin be the gravitational centre of interpretation. For better or worse this has had a major impact on discussions about human evolution in public debates and within evolutionary studies. Darwin has been so much more than just a leading figure in the history of science. Evolution by natural selection has often been synonymously referred to as ‘Darwinian evolution’ and the theory of evolution as ‘Darwin’s theory of evolution’. Scientists in evolutionary studies and related disciplines have been called ‘Darwinians’ and ‘Darwinists’, along with people who have expressed sympathy for Darwin or have appropriated elements of his theory. Darwin’s symbolic value transcends him as a historical character and has done so for close to a century and a half. Darwin is synonymous with evolution, and evolution is at the very centre of our understanding of the history of our own species.

The consequence of Darwin’s theory was that humankind was nothing but a result of natural processes with an origin shared by other animals and not the ultimate purpose in
the Universe. Humans were simply a product of life on Earth. No more, no less. So much was clear upon the publication of *Origin of Species* in 1859, even though Darwin hardly mentioned human evolution. Since then, Darwin has routinely been placed at centre stage in scientific as well as historical narratives of human evolutionary studies. To John Reader, for example, in his history of palaeoanthropology, Darwin serves as the unquestioned natural point of departure. Framing his narrative as ‘the hunt for earliest man’, Reader builds his narrative around Darwin:

if it [Darwin’s theory] were true, then the proof would be found in the fossilized remains for early man, which would link man to an earlier form. And since the theory of evolution proposed that man and the apes shared a common ancestor, then the link could be expected to bear some attributes of both. So began the search for the ‘missing link’.10

To Reader palaeoanthropology, as a discipline bound up by a quest, began with Darwin. Apes, ancestry and the hunt for that crucial piece of evidence linking humanity with our primate cousins and thus with the rest of the animal world all come together in a grand narrative centred on the defining year 1859.

The standard account of how we learned about the history of our own species begins in 1859 and it begins with Darwin. Contrary to the standard account, however, both what we learned about the history of our own species and Darwin’s history began earlier and did not spring from a single source in a single country, but gradually built through complex networks of scientific, philosophical, literary, cultural, political and popular communication between different people, languages and countries. If we want to understand how evolution assumed such a pivotal role in scientific and popular circles, we have to look beyond Darwin and see him as merely one piece in a larger and far more interesting puzzle in which he is both actor and motif.

There is an inherent danger of anachronism in speaking of evolution before Darwin, because this colours our understanding and reading of pre-1859 ideas of evolution. The historian of science James Secord rightly points out that in studies of evolutionary debates there is a tendency still to let Darwin’s *Origin of Species* act ‘both as the measure of a scientific approach as well as the interpretive guide by which earlier works are judged’, even by historians who have ‘demonstrated that a Darwin-centered account is no longer credible’. Secord’s answer to how evolution became a hot topic in Victorian England ‘turns out to have little to do with Darwinian biology’, as he explores the reading audience of Robert Chamber’s *Vestiges of the Natural History of Creation*, published anonymously in 1844.11

**ORIGINS OF THE MISSING LINK**

Incidentally, *Vestiges* introduced the concept of missing links in the context of evolution and the fossil record to a wider reading public in Britain. The idea of missing links stems further back, however, to discussions of nature’s ladder, *scala naturae*, in Christian ideas about order and hierarchical structures of nature, eventually translated into ‘the Great Chain of Being’ in eighteenth-century Enlightenment thinking. Alexander Pope and Jean-Jacques Rousseau, for example, were both thinking in terms of humans as links in a chain. The Great Chain of Being was introduced by Pope in the first epistle of his *Essay on Man* in 1732, and in *Discourse on Inequality* from 1755 Rousseau was contemplating ‘natural man’ as a midpoint between animals and human beings.12
However, neither in the eighteenth century nor in the nineteenth century was the common expression in English tied uniquely to the Great Chain of Being, human nature or evolutionary theory. The metaphor of a missing link was used in several different contexts and has been ever since. Indeed, around the time of the publication of Darwin’s *Origin of Species* in 1859 the term was widely used with reference to a Christian women’s movement to help the poor, providing a missing link between those in need and those who had something to give. Ellen Raynard had founded the London Bible and Domestic Female Mission in 1857 and published *The Missing Link; or Bible-Women in the homes of the London Poor* anonymously in 1859. The book was a great success and was soon published in America as well, to be followed by the mission’s magazine for subscribers renamed in 1865 as *The Missing Link Magazine; or Bible Work at Home and Abroad*, running under that name until 1883, and the pamphlet series *The Missing Link Tracts* edited by Ranyard in 1871. The mission, the cause, the people and publications generated substantial attention in the news and periodical press, and served well for satirical representations.  

Parallel to colloquial use of the expression, a more specialized scientific use emerged in the natural history disciplines to denote gaps in the fossil record. Among proponents of the quinarian hypothesis in the 1820s and 1830s, which was a taxonomic system dividing groups into fives, the link and chain metaphor was at the heart of the theoretical assumptions for a reinterpretation of the Great Chain of Being. If only four of the expected five species in a group were known, the fifth was expected and thus considered missing. The groups were ordered according to analogy or affinity. In *A Preliminary Discourse on the Study of Natural History* from 1834, the ornithologist William Swainson claimed that the traditional view of a linear progression of species had long been abandoned. Instead he advocated a continuous view of circular affinities with no beginning or end. But he kept the metaphorical language of links and chains, while advising naturalists to search for these links in the fossil record and among living species. There were no signs of evolution, however, and a few years later in his *Natural History and Classification of Birds*, humans were still considered to be ‘the last and most perfect of the Almighty’s work’.  

As already mentioned, Robert Chambers used the specific term ‘missing links’ in an evolutionary context in 1844 as gaps in the fossil record. Charles Lyell employed the term a few years later in 1851 in his third edition of *Elements of Geology*, but without transmutation of species. There was no great drama, just a neutral comment on the as yet incomplete fossil record as he reflected upon a problem in the Cretaceous period as ‘a break in the chain implying no doubt many missing links in the series of geological monuments which we may some day be able to supply’.  

In his Presidential Address to the Geological Society of London in the same year, Lyell was once again using the link and chain metaphor with great familiarity, indicating that it was well known by his audience. While paying tribute to recently deceased foreign members of the society, Lyell honoured Henri Marie Ducrotay de Blainville, who succeeded Lamarck as Professor of Natural History and Cuvier in his Chair of Comparative Anatomy at the Natural History Museum in Paris, by quoting Louis-Contant Prévost in his obituary in *Annales des Sciences* that it was de Blainville’s great object in life to establish in all his works, especially his ‘Osteology’, the doctrine that the whole series of organic beings was intimately related, the links of one great chain, ascending from the most simple of organisms to that which occupies the highest place; in other words, from *the Sponge to Man*.  

Hurrah for the missing link!
The chain and link metaphor was immediately put in the context of man’s place in nature and ‘the plausible hypothesis that each higher grade had been improved in the course of ages out of a lower one by transmutation’; an argument that, however, de Blainville did not agree with. Both Lyell and Prévost were referring to work and discussions in the 1830s, demonstrating that by the mid nineteenth century the concept of missing links and its implications for humans were by no means foreign to members of the geological community in Britain and in mainland Europe.

Even Darwin himself was thinking along the same lines shortly after his return from the voyage on HMS Beagle, when working on what became his theory of evolution by natural selection. There are numerous references to intermediate species and intermediate links in the so-called Notebook B and Notebook C on ‘Transmutation of Species’ written in 1837 and 1838. But, as is well known, Darwin did not make his views on this matter public until the late 1850s. However, the term ‘missing link’, the idea of missing links in a chain of being, the notion of gaps in the fossil record and the publicity of all this in various contexts were already in place well before the publication of Origin of Species. Furthermore, evolution was also a hot topic in Victorian society, and the family resemblance between humans and apes had been debated for more than a century when Darwin finally published his now most famous book. The history of the missing link and human origins did indeed not begin with Darwin.

A COSMIC BEGINNING

The public debates about evolution in Victorian England ignited in the 1840s, especially after the publication of Vestiges of the Natural History of Creation in 1844. This book addressed fundamental questions of a cosmic beginning, the making of the Earth, life out of matter, gradual organic change, common ancestry and the origin of humankind. Although not stated explicitly, it was evident that man was an immediate descendent of apes. Drawing on converging evidence from language, religion, culture and local myths around the world combined with contemporary natural knowledge of monkeys and apes, Robert Chambers placed ‘the cradle of the human family’ in Asia. In a chapter on the ‘Early History of Mankind’ he confidently wrote, ‘we should expect man to have originated where the highest species of the quadrumana are to be found. Now these are unquestionably found in the Indian Archipelago.’

Although little evidence for prehistoric fossil apes had been found in that region, Chambers was not discouraged, seeing this as one of the scientific challenges ahead. Lack of fossil evidence should not discourage anyone: ‘a few rare traces of a particular class of animals are in time found in formations originally thought to be destitute of them, displaying as it were a dawn of that department of creation. Such seems to be the case with at least the quadrumana.’ He subsequently went on to make reference to recent fossil finds in England, the Pyrenees, South America and the sub-Himalayan fields. In a chapter on the evolution of terrestrial plant life earlier in the book he had addressed the question of what there was to learn from the fossil record. Taking the example of Lepidodendron—a tree-like plant from the Carboniferous period—Chambers identified the species as a link between single-lobed and double-lobed plants and continued, ‘It is also curious to find a missing link of so much importance in a genus of plant which has long ceased to have a living place upon earth.’
In effect, long before Darwin’s *Origin of Species* was published tens of thousands of readers had been familiarized with ideas of evolution: what could be learned from the fossil record, the ancestry and geographic location of humankind, confronting religious and cultural dogmas of special creation and human uniqueness. All of this was supplied with a casual use of what grew into one of the most powerful metaphors of evolution, ‘the missing link’.

*Vestiges* was not a scientific work and was forcefully criticized for this by some of the Victorian scientific heavyweights. We cannot, however, read the scientific dismissal of the book as a unified consensus against everything it contained. Although certainly written as a popular science book, Chambers did not write *Vestiges* in an inspired intellectual vacuum. Some of the building blocks of Chambers’s grand evolutionary synthesis—a concept of deep time in the Earth’s and life’s history, and humankind’s relationship with living monkeys and apes—had been integral parts of scientific and popular culture since the eighteenth century. 22

**Owen and the apes**

It was thus with great familiarity that Richard Owen in 1855 could engage his audience at the Royal Institution in a discussion of the anatomical structure of apes compared with that of humans. It was four years before the publication of Darwin’s *Origin of Species* and, by implication, of course unrelated. Nevertheless, the entire framework was in place for Owen to charge against evolutionary theory and the idea of the family ties between primates and humans, ‘the last link in the chain of changes—from Quadrumana to Bimana’, that was proposed in ‘the hypothesis that specific characters can be so far modified by external influences, operating on successive generations, as to produce a new and higher species of animal, and that thus there had been a gradual progression from the monad up to man.’ 23

Owen was using Henry More’s *Conjectura Cabbalistica* from 1662, and not *Vestiges* or other contemporary evolutionary ideas, to make his argument. By doing so he effectively ignored contemporary evolutionists while demonstrating that their ideas had a long history. They were wrong in the seventeenth century and they were still wrong now, the implicit argument ran. At the same time, by engaging More, Owen had chosen a reputable opponent and could thus criticize his contemporaries indirectly at a safe distance without lending them the authority that his recognition would otherwise give them. The human–animal boundary was at the centre of the argument. More had referred to the animal side of man—‘he is a real brute already, an ape, satyre or baboon’—providing Owen with a fitting starting point from which to discuss the alleged relationship with apes. 24 It was understandable that More had been beguiled, Owen argued, because fanciful ideas about witches and other superstitions were still central to the seventeenth-century frame of mind. But there was no excuse in the nineteenth century, when scientific scrutiny was the order of the day.

Still without mentioning *Vestiges*, Owen drew a parallel between seventeenth-century superstition and the spiritualism ‘so scandalous prevalent’ in the mid nineteenth century, having little but scorn for the ‘lower wisdom’ that represented these issues: ‘notions, refuted and repudiated centuries ago, are, in our day, revived and popularized, with a semblance of support from the later acquisitions of science, it is meant that they should
be brought to the test of the exact results of modern inquiry.'\textsuperscript{25} Owen expressed the view that ‘the organical characters of the highest of the brute creation and their relation to these in the human species’ should be treated in a similar fashion, to be tested by modern science.

Arriving at his conclusion he thought it was fair, balanced according to his results, and open-minded. Nine-tenths of the differences, he lectured, as distinguishing the great chimpanzee [the gorilla] from the human species, must stand in contravention of the hypothesis of transmutation and progressive development, until the supports of that hypothesis are enabled to adduce the facts and cases which demonstrate the conditions of the modification of such characters.\textsuperscript{26}

To Owen’s mind there was overwhelming evidence for the conclusion that ‘Man is the sole species of his genus.’ Racial differences were merely variations of the biological unity of humankind. There were similarities and affinities, but also differences so great between apes and humans that ‘Professor Owen trusted that he had furnished the confutation of the notion of a transformation of the ape into man’, it was reported in the transactions from the meeting.\textsuperscript{27}

Owen might be wrong, but he did not think so. His confidence was displayed in front of an audience well versed in discussions of a closer relationship with primates and ideas about missing links. These issues were all part of the heated discussions about man’s place in nature before the publication of *Origin of Species*. What was most crucially missing, from a scientific point of view, was a mechanism to explain how evolution worked and also respectability for it to be taken seriously even by the most ardent critics. Although Owen did not like it, Darwin provided both.

\textbf{MISSING LINKS AND ORIGIN OF SPECIES}

With just the right combination of scientific matter-of-fact and popular appeal upon publication in 1859, *Origin of Species* made the synthesis of prehistory and life by explaining the diversity of organic life as a result of gradual change over very long periods. This combination is one of the important keys to understanding the success and subsequently the impact of *Origin of Species*, or, as James Secord succinctly puts it, ‘The dryness of *Origin* proved as important to its success as the eloquent extracts printed in the reviews. The book was just readable enough to sell, but unreadable enough not to be easily bracketed with journalism or cosmological potboilers.’\textsuperscript{28} In other words, it was sufficiently scientifically respectable not to be dismissed as another *Vestiges*.

Although Darwin famously avoided almost entirely talking about humans, the implications of his theory for our own species were not wasted on his audience and quickly became the centre of attention.\textsuperscript{29} Darwin had suggested a grand general narrative of the origin of species. However, many commentators and readers took it to be about the origin of mankind. At a lecture at the Royal Institution on 10 February 1860, not three months after the publication of *Origin of Species*, Thomas Henry Huxley tackled the issue head on: ‘unfortunately a large class of persons take fright at the logical consequences of such a doctrine as that put forth by Mr. Darwin. If all species have arisen in this way, say they—Man himself must have done so; and he and all the animated world must have had a common origin.’ In his characteristic style Huxley immediately and bluntly answered the rhetorical question with a ‘Most assuredly. No
question of it.' The problem that no direct evidence had been produced of the multiple hypothetical intermediate forms, a problem Darwin was contemplating already in the 1830s, was dismissed and Darwin’s original arguments were defended. Later, in Huxley’s *Man’s Place in Nature* and in Lyell’s *Antiquity of Man*, human origins, missing links and the geological record were systematically treated in favour of Darwin. Despite Darwin’s, Huxley’s and Lyell’s serious attempts to refute any objection or worry, gaps in the fossil record remained one of the most serious criticisms of the scientific discussion of evolution and the antiquity of humankind.

If Darwin’s theory were true, the implication was that there had to have been a continuous series of creatures connecting every living species with past ones and ultimately linking them to one single common ancestor. Critics were quick to point out that such successive series were not found in the fossil record. On the contrary, the hypothetical lineages were defined more by their gaps than by their fossils. In one of the first public reactions to *Origin of Species*, the anonymous review in *The Atheneum* a few days before the official publication date, 24 November 1859, the question was addressed directly: ‘We might fairly expect to find in the fossiliferous rocks not a few proofs of the former existence of the numerous intermediate links between distinct specific forms if the proposed theory be true.’ The identity of the reviewer was John R. Leifchild, an author and coalfield commissioner, and the son of a leading evangelical minister, not a scientific specialist. Nevertheless, Leifchild put his finger on the problem of the missing links in the fossil record and was not willing to accept Darwin’s attempt to dismiss this as a non-problem in *Origin of Species*. With playful irony, Leifchild mused, ‘an unbroken, sure, though slow, living progress towards animal perfection is a delightful vision; natural and gradual optimism is a welcome fancy. What need of distinct creation? If a monkey has become a man—what may not a man become.’ The most interesting aspect of Leifchild’s review in this context is that the question of our simian relationship and the question of missing links featured prominently, even though Darwin was not explicit about the former in his book. Hooking on to already well-known topics in mid-Victorian England, to Leifchild Darwin provided an opportunity to discuss these issues, while eventually siding with direct divine intervention and special creation. In the years immediately after the publication of *Origin of Species*, missing links and gaps in the fossil record along with the question of humankind’s origin were at the centre of public debates.

With the publication of *Origin of Species*, Darwin provided a point of reference. One book and one man were all that were needed to serve as shorthand for drawing together generations of discussions about man’s place in nature and to focus them in the discussions of generations to come. Apes that had already featured abundantly in nineteenth-century scientific and popular culture were now routinely linked to Darwin in reviews, articles, books, debates and—notably after the publication of *Descent of Man* in 1871—in cartoons all over the world. And while palaeoanthropology was gradually emerging as a scientific discipline distinct from anthropology, archaeology, anatomy and palaeontology, Darwin came to serve as standard reference in the search for fossil evidence of ancestors to the human species.

**FINDING THE MISSING LINK**

The anatomist Eugene Dubois, who volunteered to serve in the Medical Corps of the Dutch East Indian Army with the hopes of turning his military services into palaeoanthropological
research, was inspired by Ernst Haeckel to search for evidence of an Asian origin of the human species. Dubois managed to persuade the local Dutch East Indies Government of the necessity of a comprehensive palaeontological survey under his direction. In March 1890 Dubois moved to Java to head a series of excavations. The practical work was performed by convicts under the supervision of two corporals from the Engineering Corps, Gerardus Kriele and Anthonie de Winter. Hopes were high because a mining engineer, B. D. van Rietschoten, late in 1888, had discovered a fossilized skull while he was searching for marble outcrops. After investigating it, Dubois concluded that it was primitive but still human and thus not old enough to be the missing link he was searching for. However, the find confirmed Dubois in his belief that Java could yield interesting fossil remains. The excavations did indeed produce a great many extinct mammals, gradually establishing a Pleistocene fauna, but the prize came in October 1891 when a skullcap was found. With the addition of two teeth, a bit of a jawbone and one thighbone by the end of 1892 Dubois had enough to name and announce a new species, *Pithecanthropus erectus*, the upright ape-man.

Dubois saw this as a confirmation of Haeckel’s prediction that his hypothetical *Pithecanthropus alalus*, speechless ape-man, introduced in *History of Creation* from 1868, would furnish the missing link in the chain of being connecting humans with the apes and thus, ultimately, the rest of the natural world. Haeckel had been well aware that for a general audience, and even for specialists, the most interesting and controversial question would be the status of humans.35

To Haeckel the most important difference between humans and animals was language. He speculated that bipedality and the human body form were fully developed long before our species’ mental capacities to communicate verbally. First came the human body, then came the human brain, and with the bigger brain came language. ‘It was, doubtless, this process which above all others helped to create the deep chasm between man and animal’, Haeckel speculated, ‘and which also first caused the most important progress in the mental activity and the perfecting of the brain connected with it.’36 Consequently, in his stages in evolutionary development Haeckel included a twenty-first stage for his speechless ape-man, identical with that of humans in every respect except for a lack of language.

In 1898, as Haeckel received an honorary degree at the University of Cambridge during the Fourth International Congress of Zoology, he spoke on ‘Our Present Knowledge of the Descent of Man’. Haeckel had now included a few new stages in the evolutionary history of humans, moving the *Pithecanthropi* up to the twenty-fifth stage. Dubois’s *Pithecanthropus erectus* was included as the only fossil evidence hitherto found, but that was about enough for Haeckel to announce, ‘we are justified in saying that the pedigree of the Primates, from the oldest Eocene Lemures upwards to man, is now so well known, its principal features so firmly fixed within the Tertiary age, that there is no missing link whatever.’37

In their reports from the third International Congress of Zoology held in Leyden three years previously in 1895, the two journals *Science* and *Nature* agreed that the paper that excited most interest was Dubois’s ‘*Pithecanthropus erectus*, a transitional, man-like form’. The reaction from several scientific authorities demonstrated, however, that far from everyone readily accepted Dubois’s interpretation.38 Haeckel, in contrast, was confident. Dismissing, among others, Rudolf Virchow, who had chaired Dubois’s session in Leyden, Haeckel cast aside any doubts about whether or not *Pithecanthropus* was a new and genuine species: ‘He is, indeed, the long-searched-for “missing link,” for which, in 1866, I myself had proposed the hypothetical genus *Pithecanthropus*, species *Alalus*’.39
Dubois’s discovery was also celebrated in the tenth edition of *The Natural History of Creation*, likewise published in 1898, including Gabriel von Max’s image of a *Pithecanthropus* family. The painting was presented as a gift from the artist to Haeckel for his birthday in 1894.

The large, plump and grotesque characteristics that von Max had given the creatures stood in stark contrast to the elegant fantasy merely based on Haeckel’s hypothetical description presented in Henri du Cleuziou’s *La création de l’homme et les premiers ages de humanité* published in French in 1887. Cleuziou’s *Pithecantropus alalus* was tall, slender and athletic, dressed in fur and carrying an axe on the way home to his cave. Max’s *Pithecantropus erectus* family was his opposite in every way: primitive, naked, overweight, thick, immobile and miserable. Nevertheless, Haeckel embraced the painting as an acceptable representation and kept the image in subsequent editions of *The Natural History of Creation*. The anthropologist and science popularizer Edward Clodd had already taken Max’s representation to heart in his *Primitive Man* from 1895, where it featured prominently on the frontispiece as ‘Ancestors of Man (*Pithecantropus Alalus*)’. Curiously, Clodd made no mention of Haeckel, Dubois or *Pithecanthropus* in the text. In a later edition from 1909, however, Dubois’s discovery was included and through the authority of W. L. H. Duckworth at the University of Cambridge was considered to be ‘the nearest likeness yet found of the ancestor of man at a stage immediately antecedent to the definitely human phase, and yet at the same time in advance of the simian (or ape-like) stage.’

In about 1900 the missing link enjoyed a central place in scientific debates, fieldwork and public imagination (figure 1). It had many different outlooks, was often used in literature, in
advertising, in satire and to attract the attention of audiences at zoological gardens and travelling exhibitions. It had grown from a hypothetical implication of a scientific theory to a full-bodied phenomenon materializing across excavation sites, museums, newspapers, cartoons and market places. There were many contestants and rival claims to be the missing link. Many were found, many were dismissed, but few doubted its reality. There were a few voices of concern with regard to the usefulness of the term. Among them were Edward Clodd, who in *Primitive Man* wrote:

> But man is neither the offspring nor the brother of the apes; he is a sort of cousin more than ‘once removed.’ And the answer to the oft-put question, Where is the missing link between them? Is, There is no missing link; there never has been one. As with the likenesses and differences between the apes themselves, so with those between apes and man. The likenesses are explained by descent from a common ancestry; the differences have slowly arisen in subtle ways. The Primates form the upper branches of the life-tree, whose highest branch is man.42

Despite Clodd’s good intentions and regardless of the implications of his argument, he nonetheless continued to use the concept in an uncritical fashion in his writings. As more hominin fossils were discovered in the twentieth century, more candidates for the honourable status as the one and only missing link were put forward. They were all enthusiastically embraced in newspapers, magazines, cartoons, fiction, movies, television programmes and series, and by anti-evolutionists to prove Darwin wrong. Clodd’s argument against using the term was taken up as a standard reaction by many evolutionary scientists, palaeoanthropologists and archaeologists when it came to criticizing their rivals. However, when it came to promoting their own findings and research results, curiously the missing link was often found to be useful once more and brought back into the scientific limelight. In evolutionary terms it makes no sense to talk about one single missing link. People already agreed about that in the nineteenth century. However, this did not keep leading scientists and popularizers alike from advancing the idea. If anything, the missing link has definitely proved to be a survivor.

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**NOTES**


Much has been written about Dubois’s work and discovery of what is now classified as *Homo erectus* remains. See, for example, R. Leakey and J. Slikkerveer, *Man-ape, ape-man: the quest for human’s place in nature and Dubois’ ‘missing link’* (Kenya Wildlife Service, Leiden, 1993) and P. Shipman’s biography *The man who found the missing link: Eugene Dubois and his lifelong quest to prove Darwin right* (Harvard University Press, Cambridge, MA, 2001). The latter is popularly written but rich in detail and based on comprehensive archival studies.


Reader, *op. cit.* (note 8), p. 1. Reader is far from alone, and we find similar claims from numerous authors across genres, languages and media. In the popular book *The Jesuit and the skull: Teilhard de Chardin, evolution, and the search for Peking man* (Penguin, London, 2007) A. D. Aczel writes, ‘Along with Darwinism, there came a concept of a “missing link” between humans and apes’ (p. 43). Similar statements can be found in, for example, T. Frängsmyr’s *Pekingmänniskan: En historia utan slut* (Natur och Kultur, Stockholm, 2006). Another example is from the television documentary *The link* about *Darwinius masillae*, in which David Attenborough says, ‘remarkably, exactly 150 years after Darwin put forward the proposition that human beings were part of the rest of animal life, here at last we have a link which connects us with not only the apes and monkeys but also with the entire animal kingdom’ (BBC DVD, London, 2009). Accepting the palaeoanthropological concomitance to specific narratives, Glynn Isaac was little worried about the use of literary components such as missing links and heroes and pointed instead to a positive potential for talking about human evolution: ‘The legitimate excitement which scientists and lay folk alike feel over the finding of missing links, is thoroughly familiar from newspapers and magazines—as is the existence of still another involvement of palaeoanthropology with hero mythologies’; G. Isaac, ‘Aspects of human evolution’, in *Evolution from molecules to men* (ed. D. S. Bendall), pp. 510–539 (Cambridge University Press, 1985), at p. 516.


Although Arthur O. Lovejoy’s classical study *The great chain of being: the history of an idea* (Harvard University Press, Cambridge, MA, 1936) is historiographically outdated, it still
provides important pointers to the debates and their historical actors. See also F. Moran III, ‘Between primates and primitives: natural man as the missing link in Rousseau’s Second Discourse’, *J. Hist. Ideas* **54**, 37–58 (1993).


15 C. Lyell, *A Manual of Elementary Geology: or, the Ancient Changes of the Earth and its Inhabitants as illustrated by its Geological Monuments* (London: John Murray, 1851), p. 220. This was the third and revised edition of *Elements of Geology*, first published in 1838. The title for the third edition was changed slightly. Lyell continued to use the metaphor in his writings, eventually applying a more systematic approach to its use and geological implications.


20 Ibid., p. 131.

21 Ibid., p. 87.


Finally, almost at the end of the book, in his concluding chapter Darwin wrote, ‘In the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquisition of each mental power and capacity by gradation. Light will be thrown on the origin of man and his history’; C. R. Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (John Murray, London, 1859), p. 488. What role the evolution of humankind played to Darwin is a large topic in itself. As this article is not about Darwin’s own intellectual development I shall not touch on it further and shall mention only that, despite Darwin’s almost complete silence, it was indeed a topic that he had thought deeply about. In December 1857, for example, he wrote to Alfred Russel Wallace: ‘You ask whether I shall discuss “man”;—I think I shall avoid the whole subject, as so surrounded with prejudices, though I fully admit that it is the highest & most interesting problem for the naturalist’ (27 December 1857); in *The correspondence of Charles Darwin* (ed. F. Burkhardt et al.), vol. 6 (Cambridge University Press, 1990). In a recent study, A. Desmond and J. A. Moore make the radical claim that Darwin arrived at his theory of evolution through his hatred of slavery: *Darwin’s sacred cause: race, slavery and the quest for human origins* (Penguin Books, London, 2009). Desmond and Moore make human evolution the centre of gravity for Darwin throughout his scientific development. M. Ruse, among others, has reacted strongly against this new reading of Darwin: ‘Desmond and Moore do sterling service in showing how committed to the anti-slavery movement people in Darwin’s extended family truly were. But it simply isn’t true to say that this was the causal factor behind Darwin’s becoming an evolutionist or his applying his thinking to our own species’; M. Ruse, ‘Darwinian struggles: but is there progress?’, *Hist. Sci.* 47, 407–430 (2009), at p. 414. See also P. C. Kjærgaard, ‘Darwin’s sacred cause’, *Hist. Today* 59, 69 (2009), and P. C. Kjærgaard, ‘Fra korstog til kortslutning’, *Slagmark Tidsskr. Idéhist.* 54, 193–196 (2009).


[Leifchild], *op. cit.* (note 31), pp. 659–660.


It is not within the scope of this article to present the many and varied contexts in which Darwin was appropriated. These ranged from scientific, theological, philosophical and political discussions to popular culture and emerging anti-evolution movements; see, for example, Goodall, *op. cit.* (note 8); R. L. Numbers, *The creationists: from scientific creationism to intelligent design* (Harvard University Press, Cambridge, MA, 2006); C. A. Clark, *God—or gorilla: images of evolution in the jazz age* (Johns Hopkins University Press, Baltimore, MD, 2008). Several studies have demonstrated the great variation in the reception of Darwin’s ideas in different geographic contexts. For this see, for example, E.-M. Engels (ed.), *Die Rezeption von Evolutionstheorien im 19. Jahrhundert* (Suhrkamp stw, Frankfurt, 1995); E.-M. Engels and T. F. Glick (eds), *The reception of Charles Darwin in Europe* (2 volumes)

See R. Richards, *The tragic sense of life: Ernst Haeckel and the struggle over evolutionary thought* (University of Chicago Press, 2008), pp. 224–276, for an excellent introduction to *Natural History of Creation*, whose original German title was *Natürliche Schöpfungsgeschichte*. The British biologist Edwin Ray Lankester, who had studied comparative anatomy and embryology under Haeckel after graduating from Oxford, undertook a scientific revision of an English translation that was published in 1876 under the slightly less provocative title *The History of Creation*.

Haeckel, *op. cit.* (note 6), p. 300.


38 ‘The Third International Congress of Zoology, Leyden, Sept. 16–21, 1895’, *Science* (N.S.) 2, 565–576 (1895) (see the discussion on pp. 573–574), and ‘The Third International Congress of Zoology at Leyden’, *Nature* 52, 554–555 (1895). Haeckel’s lecture generated great excitement and applause at the meeting. See, for example, the coverage in *The Standard* on the following day: ‘The International Congress of Zoology’, (Saturday, 27 August), 2 (1898).


